

REMARKS

Examiner T. Nguyen is thanked for the thorough examination and search of the subject Patent Application. Claims 47, 48, 51-53, 55, 64, 66, 70, 71, and 73 have been amended.

Reconsideration of the rejection of claims 47-77 under 35 U.S.C. 112, first paragraph is requested in view of the amendments to the Specification, the drawings, and claims 47, 48, and 70. The Specification has been amended to remove the reference to the close-together vias 41 as required by the Examiner. These vias have also been removed from the drawings. The claims have been amended to claim a single isolated via, but do not claim other vias. The close-together vias in the drawings, specifications, and claims are removed without prejudice. Applicants do not admit that the close-together vias constitute new matter, but believe that they are not necessary for allowance of the patent claims. The claims have been amended to make clearer the material that is claimed and that was originally present in the patent application. The existence and the removal of the material does not make a difference to the actual scope of the patent.

Reconsideration of the rejection of Claim 51 under 35 U.S.C. 112, first paragraph is requested in accordance with the following remarks. Note the discussion of Fig. 4 on page 16 of the Specification. The interfaces 47 and 48 of the interconnect vias with their respective underlying copper lines are highlighted. The second paragraph of page 16 notes that “the interface between the first via 38 and the first layer 44 of metal, and the interface between the second via 40 and the second layer 46 of metal are equally well created and show no deviation from an ideal, flat and well-connected interface.” Thus, the slot of the invention relieves stress at

the interface of the via with either the overlying or the underlying metal line. The second paragraph on page 12 states that the failure modes are created by stress exerted by the metal lines “either underneath or overlying the via”. The last paragraph on page 12 describes 31 as a layer of metal either underlying or overlying the interconnect via 30. The slot placed in layer 31 provides the solution to the stress problem in either the overlying or the underlying metal line. It is believed that these teachings provide support for the first slot in the first copper line providing stress relief at the interface of the second single isolated via and the second copper line, as claimed in Claim 51.

Reconsideration of the rejection of Claims 47-77 under 35 U.S.C. 112, second paragraph, is requested in view of the amendments to the Claims 47, 48, 51-53, 55, 64, 66, 70, 71, and 73. Reference to other vias located elsewhere on the substrate has been removed from the claims. Claim 47 has been amended to provide antecedent basis for the first copper line and claim 70 has been amended to provide antecedent basis for the second copper line. Claim 52 has been amended to clearly refer to the interface between the second single isolated via and the second copper line. Claims 53, 55, 64, 66, 71, and 73 have been amended to more clearly define the three portions of the slot that form the single slot of the invention.

All Claims are believed to be in condition for Allowance, and that is so requested.

Reconsideration of the rejection under 35 U.S.C. 103 of Claims 47-77 as being unpatentable over Andricacos et al in view of Kazuhiko Kasahara is requested in view of

Amended Claims 47, 48, 51-53, 55, 64, 66, 70, 71, and 73 and in accordance with the following remarks.

It is agreed that Andricocos et al teaches fabricating copper alloy interconnection lines. However, Fig. 9 shows two copper alloy vias located close together and contacting the same underlying copper alloy line through the middle dielectric layer. Applicants' invention addresses single isolated copper vias. (See, for example, the second paragraph on page 5 of the Specification and the claims) This means that no other copper vias are in the vicinity of the single copper via. The Examiner states on page 11 of the Office Action that Andricacos et al "discloses the formation of a single copper via isolated from other copper vias, regardless of how far they are isolated from each others". It is not agreed that either of the two copper alloy vias shown in Fig. 9 connecting to the same underlying copper alloy line can be construed as being single isolated vias. The Random House College Dictionary c. 1984 by Random House, Inc. defines isolated as "separated from other persons or things; alone; solitary". Neither of Andricacos' vias are alone or solitary.

Kasahara teaches formation of "a plurality of rows of slits 16" (first line of the Constitution). Applicant's invention provides a single slot in a copper line only in the vicinity of a single isolated via and adjacent to the single isolated via. It is believed that the amendments to claims 53, 55, 64, 66, 71, and 73 clearly define the three portions of the slot that form the single slot of the invention. Kasahara does not teach or suggest forming a single slot only adjacent to the single isolated via. Kasahara shows many slots throughout the copper line, not only adjacent to the single isolated via. This approach is discussed in the last paragraph of page 5 of the

Specification. The practice of uniformly adding slots to wide copper lines does not solve the problem of localized stress associated with isolated single vias connected to metal lines because of the "lack of selectivity of the location of the slots." Neither reference teaches or suggests placing a single stress-relieving slot in a metal line only in the vicinity of a single isolated via.

Reconsideration of the rejection under 35 U.S.C. 103 of Claims 47-77 as being unpatentable over Andricacos et al in view of Kazuhiko Kasahara is requested in view of Amended Claims 47, 48, 51-53, 55, 64, 66, 70, 71, and 73 and in accordance with the remarks above.

Allowance of all Claims is requested.

It is requested that should Examiner Nguyen not find that the Claims are now Allowable that the Examiner call the undersigned at 765 4530866 to overcome any problems preventing allowance.

Respectfully submitted,



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Attachment: drawing sheet